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A Method of Costing Partially Completed Orders

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A METHOD OF COSTING PARTIALLY COMPLETED ORDERS

The purpose of this article is to present a method of cost accounting for partially completed orders. No claim is made that there is anything novel or new in this method. The article deals with some things we have worked out in a plant which have resulted in considerable saving of clerical effort, and at the same time have given more satisfactory cost results.

Costing of Continuous Production

One of the things which causes a large amount of clerical work and a great deal of dissatisfaction is the attempt to obtain costs at the close of a month on items which are run more or less continuously, and which are in every possible stage of completion at every monthly closing. In such cases there is seldom a completed order or a definite stopping place at which cost can be figured. Two methods are probably in most common use to meet such conditions. One method is to use a cost of sales figure based on previous costs and then to absorb the difference between this figure and the actual cost, when obtained, in the cost of sales of subsequent months. The other method is to obtain the actual cost of the quantity completed and carry forward as work in process the cost of the uncompleted articles. The second method should give the more satisfactory results, but, as the reader well knows, it involves a considerable amount of clerical labor.

Let us assume that we are manufacturing an article which requires six machining or hand operations. We draw from stock the material for 5,000 pieces and therefore will have a charge in the material section of our cost sheet for sufficient material to make 5,000 completed articles. We will assume that all of the 5,000 pieces are processed through the first operation; that 4,000 pieces are processed through the second operation; and progressively 500 fewer pieces are processed through each of the succeeding operations, so that only 2,000 pieces are completed in the last operation. We have charged the cost of processing and the overhead applicable, for the six operations on 5,000, 4,000, 3,500, 3,000, 2,500 and 2,000 pieces, respectively (see illustration, p. 4).

Out of the 2,000 completed pieces we have shipped 1,800 pieces. Our problem is to obtain the cost of the 1,800 pieces in order that this cost may be used as an offset to the billing value when making up a profit and loss statement for the period. The method of obtaining the cost of the 2,000 completed pieces is to obtain the cost of one piece of material and the cost of processing one piece

in each operation and to multiply this figure by the number of pieces completed (see illustration). If, as a matter of convenience, we subtract the cost of the 2,000 completed pieces from the material and the operation costs, and bring down the remainder in each case, these remainders will be the starting point for the cost during the next accounting period and the sum of these remainders will be the value of the work in process.

This procedure is all very simple, but who has not had the experience, when attempting to get a cost in this way, of finding that inaccuracies have crept into the reports (either in the shop or in the production or the cost departments), so that No. 3 operation shows more pieces completed than No. 2 and, possibly, No. 1 operation shows more pieces completed than were drawn from stock.

Cost Summary Order No

Operation Number	Months Production			Finished			Work in Process		
	Pcs		$	Pcs		$	Pcs		$
one	5000	20	1000	2000	20	400	3000	20	600
two	4000	30	1200	2000	30	600	2000	30	600
three	3500	15	525	2000	15	300	1500	15	225
four	3000	25	750	2000	25	500	1000	25	250
five	2500	16	400	2000	16	320	500	16	80
six	2000	10	200	2000	10	200	-		-
Material	5000	80	4000	2000	80	1600	3000	80	2400
Totals			8075	2000	1.96	3920			4155
Shipped				1800	1.96	3528			
Remainder				200	1.96	392			4155

This form is designed to illustrate the probable course of an order through the several operations and one method of obtaining the finished cost. This is the method referred to as entailing a large amount of clerical labor.

Frequently the writer has found cases somewhat as follows: Completed in the first operation, 5,000; in the second operation, 3,000; in the third operation, 4,500. Obviously, we could not have more completed pieces in the third operation than in the second. Our difficulty is that errors have been made in handling the records and the second operation should show 4,000 instead of 3,000, while the third operation should show 3,500 instead of 4,500.

The reader knows that this matter presents a problem which requires a good deal of investigation to work out, and of course adds to the labor involved in obtaining the cost. It can be done and is done in very many cases. Nevertheless, the writer is sure that many inaccurate results are obtained, either because the fault in the records could not be definitely located, or because the cost clerks in charge assume to adjust the figures by transferring postings from one operation column to another without taking the time and trouble to determine the facts.

Now, some may say that such a condition cannot obtain in a plant well organized and well conducted. It will be argued that the supervision which the production department should maintain over such records will produce accurate accounting for each operation, and that the only possibility of error is in posting in the cost department and that such errors could easily be detected. But facts and not theories are being presented in this article. Many a system is laid out in theory which produces perfect results. Perhaps it has been my misfortune not to become associated with the particular industries where errors are not made. One thing which is sure is that in the great majority of cases with which the writer has come in contact there has been constant difficulty because of inaccuracies in reporting and recording operation results. If in any particular case we can adopt methods that will eliminate these difficulties we will be much better off than if we must contend with them.

By way of illustration, I will describe some of the cost methods of the Wagner Manufacturing Company, which is engaged in the manufacture of iron and aluminum cooking utensils. The plant consists of two foundries, one for iron and one for aluminum; separate machining departments for each class of ware; a polishing department for aluminum, and a grinding department for iron; cleaning, packing, storage and shipping departments.

Cost Procedure in the Aluminum Department

The methods used in this plant will be described by referring to the aluminum department, because the methods in this department are simpler than those in the iron foundry. This department consists of the foundry, which includes the removal of gates and sprues, intermediate storage, machining, polishing, cleaning, packing, finished stores and shipping. In the machining and polishing departments the work consists of numerous operations. Almost always there remains at the end of the month uncompleted work

on each of five or six hundred articles. The problem of separating finished costs from work in process on such a large number of articles was so great as to be almost prohibitive.

If all of the work begun in any month could be completed in the same month, so that only finished articles remained in the factory at the close of the month, there would be no problem. Assuming that the shop charges were made against the proper articles, then the sum of the charges against any one article would be the cost of the number of articles manufactured for the month. Naturally, it never happens that all the work begun in a month is completed in the same month. Furthermore, in this particular instance, most of the manufacturing is continuous and is not covered by specific factory orders, so that there is always a large number of articles, some of which are in every stage of manufacture.

One of the chief difficulties which confronts us is entirely of our own creation. We are so accustomed to thinking in arbitrary monthly units, thinking that everything must culminate as of the last day of the month, that it has not occurred to us to ignore the calendar and thereby save ourselves a lot of work. In the case under discussion we have ignored this calendar division. We do not decide what quantity is to be made on an order until the last day of the month is reached. The quantity decided on is just the quantity which has gone through the first operation. Our problem then is to follow the items in process through to completion and consider the manufacture of these articles as though a separate factory order were issued at the start.

Before the change was made the polishing and cleaning departments were always congested. These are large departments in which there was not much supervision. It was a very common thing for piece-workers to sidetrack undesirable work until forced by an investigation from the production department to complete it and send it through. We decided that articles which were started in the first operation on the last day of the month must be completed in as many days as there were operations required. In other words, if there were five succeeding operations, this article must be completed on the night of the fifth of the next month. The factory executives contended that this could not be done, and that it would take a month in many cases to complete this work. However, we were fortunate in securing the co-operation of both the management and the department foremen and we determined to give this method a trial.

First, it was necessary to arrange for a more definite cut-off between the foundry and the machining departments, and it did not seem that room was available. Nevertheless, we fenced off part of the foundry space, as well as part of the space in the machining department, and ordered that all work from the foundry be delivered to this intermediate room instead of to the next department.

Three or four days before the close of the month we secured the co-operation of the foreman of the sawing and edging department, and had him work toward cleaning up everything in his department by the end of the month. This department is really considered as part of the foundry, its function being to remove the gates and sprues, and deliver the castings to the intermediate storage. As a rule, work should be out of this department the day after it is cast. No great difficulty was experienced here, although work was found in the department which had been there for a long time. On the 1st of December this department was working on November castings. The time cards, which also serve as production cards, were dated December 1, but were stamped plainly "November," indicating that the labor was applied to November production. Before the close of the first day all November work was out of this department and in intermediate storage.

Procedure in the Machining Department

The same plan was used in the machining department. Work was gathered from under benches and from every conceivable place, some of which had been in the department for more than a year, and the men were made to finish it and send it through. This was done with little difficulty. On the night of the last day of the month considerable progress had been made toward cleaning up the department. Orders were issued that on the following day no work should be drawn from the intermediate storage for any workman as long as there was anything in the department which he could do. Work performed on the first day of December on November castings was reported on the time cards as usual, but these cards were stamped with the word "November," as already explained. As soon as a man completed his November work he started on December castings and the only change in procedure was that the time cards were not marked "November." The last of November work was out of the department on the 5th of December, but most of it was out on the 2nd.

Procedure in the Polishing Department

The next department, the polishing department, offers a better example of how the plan worked. This department was in a very unsatisfactory condition owing to such an accumulation of work that the men could not work efficiently. Several days before the close of the month orders were issued to this department that it must not draw on the machining department without the specific approval of the production department for each withdrawal. There was a little grumbling, but not nearly as much as we had expected. Every man was required to complete work which had been assigned to him, some of which had been under his bench for so long a time that no one could tell when it arrived in the department.

By the end of the month this department began to show some improvement.

On the last day of the month we stationed one of the cost clerks in the machining department with instructions to see that no material was moved from this department to the polishing department except on specific authority, as already mentioned. Of course, it was necessary to let some December work come through before November work was entirely completed; otherwise some men and machines would have been idle. Where this was necessary, the cost clerk, who had been stationed at the entrance to the polishing department, was given instructions as to what material to release and made out the time card to accompany the material. All other time cards used in the department, although dated December, were stamped November, thus indicating, as before stated, that this was December work performed on November production. No man in this department was allowed any December production until his old stuff was entirely completed. This department was nearly cleaned up on the 5th of December, and probably 75 per cent of the time cards used during these five days were stamped "November."

It was a revelation to the foreman of the department and also to the men to see how nicely this plan worked and what a difference it made in the appearance of the department. There was now plenty of room for everybody and several polishing wheels which had not been in use, because the surrounding space had become storage space, could now be put in operation.

The same methods described above were used in each department. It was the 9th of December before all of the work processed in the first operation in November was completed and delivered to the finished stock room. The payroll department handled the December time cards without regard to whether or not they were stamped November. The cost department, however, posted all December cards which were marked November to the November records. The total amount of labor on such cards was credited to accrued payroll to distinguish it from the regular November labor.

Cost Methods in Making Monthly Closings

In closing the November accounting we had December labor and overhead charged to November costs and appearing in the November inventories, but this was offset by the item of accrued payroll and the credit to the expense distribution account. When closing the cost orders, all cards stamped November were posted as though the work had been done in November, but the regular December cards were posted to the cost sheets for the month of December. By this method, on the 9th of December, every cost sheet for November showed only completed work, and the laborious task of getting costs on partially completed work was done away with.

The plan worked very much better in succeeding months and at the end of the fourth month was operating with entire satisfaction. Every department now looks forward to having a "clean-up" at the end of the month. When closing the accounts for April, we were gratified to find that the last of April production was in the finished stock room on the 5th of May.

In cases where parts are processed for assembly at a later date, the parts are handled in the manner described for completed articles and are sent to the parts store room.

Under this plan nearly all the clerks in the cost department are assigned to the factory on the afternoon of the last day of the month to prepare for the separation of the two months' work. The clerk who goes into the first department is generally back in the cost department on the 2d of the next month, while the clerk who goes into the finishing department is generally at his place in the cost department on the 4th of the month, but is sometimes required to keep in touch with the finishing department for another two days.

At first this condition may seem to be a loss to the cost department in being deprived of the services of these men in whole or in part for a period of from one to six days. As a matter of fact, the time spent by these clerks in the factory would be time well spent if it did not, in any sense, reduce the clerical work required in the cost department. These clerks are now more interested in their work. They know what it is all about and feel a responsibility for results which they did not feel before. But it is not necessary to consider this big advantage in arriving at the conclusion that it is profitable to have these cost clerks in the factory at this time of the month, because it has been demonstrated, beyond any possibility of doubt, that the saving in the cost department by being able to work entirely from completed orders is many times greater than the time lost to the cost department by reason of the absence of these clerks.

Summary

Now to summarize, in just a few words, everything described above, the plan is this:

Issue production orders showing maximum quantities only. At the end of the month enter on these orders as the quantity to be produced the same quantity that was processed through the first operation.

Complete these orders in the cost department as of the month in which they were started, but, for accounting purposes and bookkeeping convenience, recognize the calendar months.

An order is named according to the month in which it is started. For instance, an order started in November is a November order and is treated as such until it is completed, although that is the 6th of December.

The December labor and expense carried into November rec-

ords is offset by accrual accounts which clear themselves in the month of December.

If you think this cannot be done in your plant, you will be just like the ordinary human being who believes that what has not been done cannot be done. Of ccourse, there are concerns where this method could not be used, but the opinion is ventured that few have more complicated problems than the manufacture of between eight hundred and a thousand articles, the production of which had been allowed to drag for periods of from two to twelve months.

In this case the cost department rendered a very distinct service to the manufacturing department, in addition to lightening its own work.